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Item 10.2 of the provisional agenda

ENVIRONMENTAL INDICATORS

Note by the secretariat

1. The informal meeting on Environmental Indicators was held in Geneva from 27 to 29 November 1985. The following countries participated in the meeting: Canada; Finland; Germany, Federal Republic of; Hungary; Italy; Netherlands; Norway; Sweden; Switzerland; and the United Kingdom. Also present at the meeting were the United Nations Environment Programme (UNEP) and the European Economic Community.

2. Ms. I. Fängström (Sweden) chaired the meeting.

3. The conclusions reached at the meeting are summarized in the Annex to this note. They were also brought to the attention of the meeting on frameworks for environment statistics, which was held in Geneva, 2-6 December 1985.

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ANNEX

Summary of the conclusions reached at the Informal Meeting on Environmental Indicators held in Geneva, 27-29 November 1985

(as adopted at the closing session of the meeting)

I. PURPOSE AND ORGANIZATION OF THE MEETING

1. The Informal Meeting was convened to review and amend as necessary the draft set of ECE environmental indicators, which had been prepared for the attention of the Conference of European Statisticians at its 1985 plenary session 1/. The Meeting was also asked to formulate a recommendation regarding the use of the draft set of indicators in the forthcoming preparation of the experimental Compendium of ECE Environment Statistics.

2. The Meeting based its discussion on document CES/548/Add.6 and discussed its various parts in detail. The discussion related to the indicator concept proposed in the introduction of the document, to the way in which indicators would best be presented and to the review of each of the proposed indicators. Suggestions for future work were made in relation to various topics revised in discussion. The discussion of the revised set of indicators also took into account Working Paper No. 1 as well as a number of spontaneous proposals for indicators.

II. REVIEW OF THE REFERENCE DOCUMENT

II.1 The indicator concept

3. The Meeting approved the conceptin the broad lines as described in the introductory part of document CES/548/Add.6. However, it was also noted that the concept does not permit the identification of indicators as such in all cases. The concept has rather to be seen as an instrument that permits the indentification of some statistical variables that do not qualify as environmental indicators. Consequently, the proposed concept might contribute to keeping the number of ECE environmental indicators relatively low.

4. Several suggestions for incorporation into the introduction to the draft set of ECE environmental indicators were made:

(a) Two ways of determining environmental indicators exist: by aggregation of basic data and by selection. The ECE concept aims at selection, although the door should remain open for the introduction of index-type indicators in the set.

(b) The term "system" of indicators should be replaced by "set" of indicators throughout.

(c) The predictive capacity of indicators (or of some of them) should be commented upon.

(d) The fifth paragraph of section I.1 should be deleted from the text.

(e) The list of environmental concerns under I.2 should include a reference to ECE in its title.

1/ Document CES/548/Add.6

(f) The reference to matrices in the penultimate paragraph of Section I.2 should be deleted.

(g) The use of the set of indicators for international comparison should be mentioned in I.3.

(h) Section I.4 should be redrafted and provide for general orientation only.

II.2 The format for presentation

5. The Meeting approved the format for presentation as included in the reference document with the following amendments and clarifications:

(a) The third section in the format should be headed "conventions for measurement and computation".

(b) Unless stated otherwise, the spatial unit for which the indicators should be computed is the country as a whole.

(c) Where applicable, indications should be given of the preferred way in which indicators should be presented.

II.3 Review of proposed indicators

6. The Meeting retained six indicators (after amendment) from its review of the discussion papers. The text included under the heading "significance" in the final presentation was considered in detail. A number of suggestions were made for inclusion in the other parts of the presentational format (reported under "other points" below for each indicator). The Meeting recommended the following from this discussion:

A. Land use changes

Significance: The indicator describes the net changes of broad classes of land use. Such changes are usually the result of human activities. They may influence environmental quality and habitats. Changes to built-up land are seen as being close to irreversible for all practical purposes and, thus, create special conditions for land resource management.

Other points: Fourfold breakdown into agricultural - forest - built-up - other land; measured or estimated for the most recent five year and 30 year periods; net additions of land are measured for each category as percentage of initial land surface in the category.

B. Forest damage

Significance: The indicator demonstrates the results of damaging influences on the forest, such as air pollution, insects and diseases, as well as fire and storm etc. However, it is not possible to determine the precise cause or causes of forest damage in all cases. The indicator contributes to the assessment of forest resources and of related habitat quality.

Other points: Conceptual references and conventions for measurement and computation as in Working Paper No. 1; category "Storms, etc." should be spelled out in detail.

C. Emissions of selected air pollutants

Significance: The air pollutants selected are sulphur dioxide, nitrogen oxides and particulate (suspended) matter. These are pollutants usually emitted in large quantities and well-documented in most countries. However, other air pollutants exist which also may be dangerous from many points of view. Sulphur dioxide is mainly emitted from stationary sources and emission is often statistically correlated with the emission of other pollutants. Nitrogen oxides are mainly discharged from mobile sources into the air. Particulate matter in the air creates risks which are partly different from the risks created by sulphur and nitrogen oxides. Emission of air pollutants influences air quality and emission data may help to evaluate data about quality of other media, of species and of habitats.

Other points: Should be related consistently to either total population, total energy consumption or total land area.

D. Wet acidifying deposition

Significance: Acidifying deposition, both wet and dry, is known to constitute a major threat to both aquatic and terrestrial ecosystems. It also can damage buildings and similar structures. Acidifying deposition to a large extent originates from emission of sulphur dioxide and nitrogen oxides into the air. Although dry deposition is generally not measured, wet and dry deposition are correlated, their relative importance changing with the distance from the source. The indicator is used in evaluating air quality and the quality of other media. It is of particular relevance to the assessment of background levels.

Other points: Annual averages are calculated for the purpose of eliminating seasonal variations; presence of further variations may require averaging over longer time periods.

E. Concentrations of selected substances in the ambient air of major human settlements

Significance: The substances selected for the purposes of this indicator are sulphur dioxide, nitrogen oxides and particulate (suspended) matter. These three substances are often used to provide a broad picture of air quality in human settlements, although other pollutants may also generate considerable exposure risks. While ambient air quality information as such does not permit the determination of risk levels for the exposed population (exposure data would be required together with reliable knowledge about effects), it can be assumed for all practical purposes that an increase in average concentration levels over time is likely to imply an increase in risks. The indicator is valuable in assessing the quality of human settlements.

Other points: The median, the arithmetic mean and the 98 percentile should be used.

F. Protected areas

Significance: The indicator describes protected areas in terms of protection categories. It represents past decisions by environmental management authorities to conserve natural habitats or other areas in order to protect species, habitats, landscapes or similar items considered worthy of protection. The indicator can be seen to reflect the natural endowment of a country as well as the degree of risk

to which items worthy of protection would be exposed in its absence.

Other points: To be related to total area.

7. In addition to these indicators, the Meeting developed three which were not proposed in previous documentation. They are recommended as follows:

G. Generation of solid wastes

Significance: Solid wastes need to be treated and/or disposed of. The related problems of solid waste management depend on weight, volume and composition of waste in terms of materials. This indicator relates to weight of waste and can be used to describe trends in the generation of solid waste over time.

Conceptual reference : Draft ECE Standard International Classification of Solid Wastes.

Conventions for measurement and computation: For any given year, tonnages of waste generated are calculated for the following categories:

- Agricultural and forestry wastes (category A.1 of the reference classification)
- Industrial wastes (A.2)
- Mining and quarrying wastes (A.4)
- Household and similar wastes (A.9)
- Total of remaining categories of the reference classification (A.3; A.5; - A.8; A.10).

The tonnage of each category is divided by the mid-year population estimate or by total area.

H. Total abstraction of water per head of population

Significance: Growing needs of water for agricultural, industrial and domestic uses may seriously stress the available water resources. The indicator provides for basic information on the use of water resources.

Conceptual reference: Draft ECE Standard International Classification of Water Use and Quality.

Conventions for measurement and computations: For any given year, total abstractions of water (item 1.5.1 of the reference classification) are divided as a whole and for water management areas as they may be established in any country (i.e. watershed areas, river basins, etc.).

I. Production of primary forms of energy

Significance: Energy resources are used extensively in a wide variety of human activities. The use of the resource base is one of the concerns of resource management. The production of primary energy contributes to the depletion of indigenous resources of non-renewable forms of energy. Environmental concerns with media, media quality and generation of hazardous wastes are related to the

generation of electricity from nuclear and hydro sources.

Conceptual reference: Concepts and definitions used in the Annual Bulletin of General Energy Statistics for Europe.

Conventions for measurement and computation: For any given year, production of primary energy (joule) is reported separately for

- fossil fuels
- nuclear electricity
- hydro electricity
- total primary energy

8. In the course of this discussion, the Meeting identified a number of priority areas of environmental concern for which indicators are needed but at present are not available. These priority concerns are mentioned under the section on further work below.

II.4 Reasons for not retaining proposed indicators

9. Document CES/548/Add.6 and Working Paper No. 1 for the Meeting contained a number of additional indicator proposals, which the Meeting did not retain in the recommended set. Likewise, some spontaneous proposals were discussed but not included in the recommended set of indicators. These proposals were not retained because at least some participants had doubts as to their suitability as ECE environmental indicators. The main substantive reasons for not retaining them were the following:

Forest area by type of forest (II.1 in document CES/548/Add.6)

Does not correspond sufficiently to the underlying indicator concept (that it should be indicative of more than what is actually measured); could be seen to duplicate land use information.

Forest area per capita/per total land area (II.1* in Working Paper (WP) No. 1)

Does not permit interpretation that is sufficiently important to environmental concerns.

Cutting and regeneration of forest (II.3 of CES/548/Add.6)

Combines "volume" information with "area" information; is not of sufficient interest.

Harvesting intensity (II.3* of WP No. 1)

Does not address concerns with cutting of forest in a sufficient way; resource concerns not sufficiently covered; does not correspond sufficiently to the underlying indicator concept.

Regeneration of forest* (II.3** of WP No. 1)

Does not correspond to the underlying indicator concept in a sufficient way.

Total generation of hazardous waste (II.6 of CES/548/Add.6)

Existing data are not internationally comparable; severe restraints on data availability in many countries; too rough for recognizing differences in degree of hazard.

Expenditures for purposes of environmental protection and management (II.9 of CES/548/Add.6)

Too many conceptual difficulties in determining the coverage of environmental protection expenditure; controversial as an environmental indicator.

Temperature-rainfall climograph (II.11* of WP No. 1)

Conceptually too complicated; difficulty in interpretation; too vaguely associated with the concept to which it relates.

Protection of occupants of buildings against noise (II.12* of WP No. 1)

Indoor noise not always seen as an environmental concern; protection against noise might take emphasis away from noise abatement policy; does not reflect sufficiently noise level, exposure, nor environmental management concerns.

10. Two of the spontaneous proposals for indicators were not retained, although the related environmental concerns were considered being priority concerns. The spontaneous proposals and the reasons for not retaining them were:

a) Exposure to daytime road traffic noise in selected urban areas

Significance: Noise is among the most resented emissions. Road traffic is frequently cited as the most important source of outdoor noise nuisance in urban areas. The indicator is restricted to daytime road traffic noise and, thus, does not cover all sources of noise. Furthermore, it is based on an assessment of the population living in areas exposed to traffic noise and, consequently, does not measure actual nuisance levels. The indicator may be used for purposes of describing the quality of human settlements from the point of view of daytime road traffic noise.

Conceptual reference: DAYTIME ROAD TRAFFIC NOISE
Measured in front of the most exposed façades of buildings and expressed in Leq (6h - 22h) dBA.

Conventions for measurement and computation: For selected urban areas, the daytime road traffic noise is sampled. The sampling results are used to delineate areas within the limits of the urban area concerned, in which outdoor noise levels exceed 55, 60, 65, 70 and 75 Leq (6h - 22h) dBA respectively. The population living in the thus delineated areas is estimated from population census data or the current population estimate, whichever is the most recent. Data are presented as percentage of the total population in the urban area concerned.

Reasons for not retaining this indicator: Conceptual difficulties in describing exposure; only relevant to local areas; only part of noise concerns is covered; methodological problems as no household survey data are included.

b) Number of species in selected genera

Significance: This indicator indicates, very simply, the richness of the area under analysis. The genera selected are mammals and freshwater fish, which are viewed as the most sensitive to changes in land and water habitats. The concerns addressed are therefore 3 (Wildlife), 9 (Forest and other biological resource) and 17 (Species and habitat quality).

Conceptual References: Draft ECE Standard International Classification of Fauna, Flora and their Habitats.

Conventions for computation: For each of the two genera, total number of species observed and number threatened and endangered should be calculated and presented. The indicator should be shown for the most recent year available, and 10 years as near as possible before.

Reason for not retaining this indicator: Does not correspond sufficiently to the underlying indicator concept; genera are arbitrarily selected; methodological difficulties over assessment of migratory species.

11. The Meeting noted that the totality of its recommendations reported in sections II.3 and II.4 do not produce a balanced set of indicators as compared with the list of environmental concerns. For example, the recommended set includes relatively many indicators on concerns with ambient air. It was hoped that a more balanced set could be established through future work.

III. COVERAGE OF ENVIRONMENTAL INDICATORS IN THE EXPERIMENTAL COMPENDIUM

12. The Meeting reiterated the earlier recommendation to test the full draft set of ECE environmental indicators during the preparation of the experimental Compendium of ECE Environment Statistics. It was noted that only the indicator on forest damage requires additional information, while the other indicators could be compiled from data which are planned to be collected.

13. The following detailed suggestions were made, which would be taken into account during the preparation of the experimental Compendium.

(a) The indicators should not be grouped in one separate section.

(b) The text accompanying the indicators should be based on the section "significance" in the presentational format of each indicator.

(c) The indicator "Emissions of selected air pollutants" should be presented in relation to total population, total energy consumption as well as total land area. It is hoped that this experiment will shed light on the question of which is the most appropriate denominator of the indicator.

(d) The indicator "Generation of solid wastes" should be presented in relation to total area as well as to total population. It is hoped that this experiment will shed light on the question of which is the most appropriate denominator of the indicator.

(e) Temperature-rainfall climographs might be tried as a convenient form of presentation.

IV. FURTHER WORK

14. In discussing further work, the Meeting recognized that both secretariat and country resources will have to be made available to the forthcoming compilation of the experimental Compendium of ECE Environment Statistics. Accordingly, work on environmental indicators in the near future should be limited to those activities which are indespensable for the preparation of the experimental Compendium.

15. The corresponding work includes the preparation of a set of indicators as revised in the light of the recommendations by the Meeting. Subsequently, the

revised set should be tested in the preparation of the experimental Compendium, and the results of the test should be evaluated.

16. After completion of these tasks, further work should be undertaken in three respects. Firstly, the concept underlying the ECE set of indicators should be further clarified and developed, with special regard to presentation of indicators, their intended use by different user groups, typical differences between national and international uses, and the like.

17. Secondly, work should also be directed at removing the shortcomings of the indicators that are recommended by the Meeting. The major shortcomings identified relate to:

- Detailing of "other causes" in the forest damage indicator.

- Standards for comparable information on protected areas.

- Coverage of the generation of solid wastes.

18. Thirdly, the following priority concerns which remain at present uncovered were identified:

- Noise

- Water quality (to be dealt with after a classification by broad quality class becomes available)

- Hazardous waste generation

- Wildlife and vegetation.

19. Finally, the Meeting recommended to continue work on methodological problems in the development of environmental indicators and indices.

20. In conclusion, the following was recommended for inclusion in the programme of work of the Conference (programme element 12.5.2):

12.5.2 Environmental indicators

Description: Identification of measures which can be used for describing the state and development of the environment in defined areas of concern in relation to the work area as a whole (in co-operation with the United Nations Statistical Commission and other international organizations); study of methodological problems involved in the formation of environmental indicators.

Work accomplished: The informal meeting on environmental indicators was held in November 1985. It recommended a revised Set of ECE Environmental Indicators, its use in the preparation of the experimental Compendium of ECE Environment Statistics and topics for further work.

Work to be undertaken: (i) Preparation of a revised draft Set of ECE Environmental Indicators (secretariat); (ii) test of the Set in connection with the preparation of the experimental Compendium (secretariat, with the assistance of national rapporteurs); (iii) evaluation of the test (secretariat); (iv) consideration of the evaluation at a meeting; (v) further elaboration of the concept applied to ECE Environmental Indicators (secretariat); (vi) improvement of the existing indicators (secretariat); (vii) development of new indicators filling present gaps (secretariat); (viii) consideration of methodological issues in the development of environmental indicators and indices (secretariat, with the assistance of national rapporteurs). Meeting when required.

Duration: Continuous.